

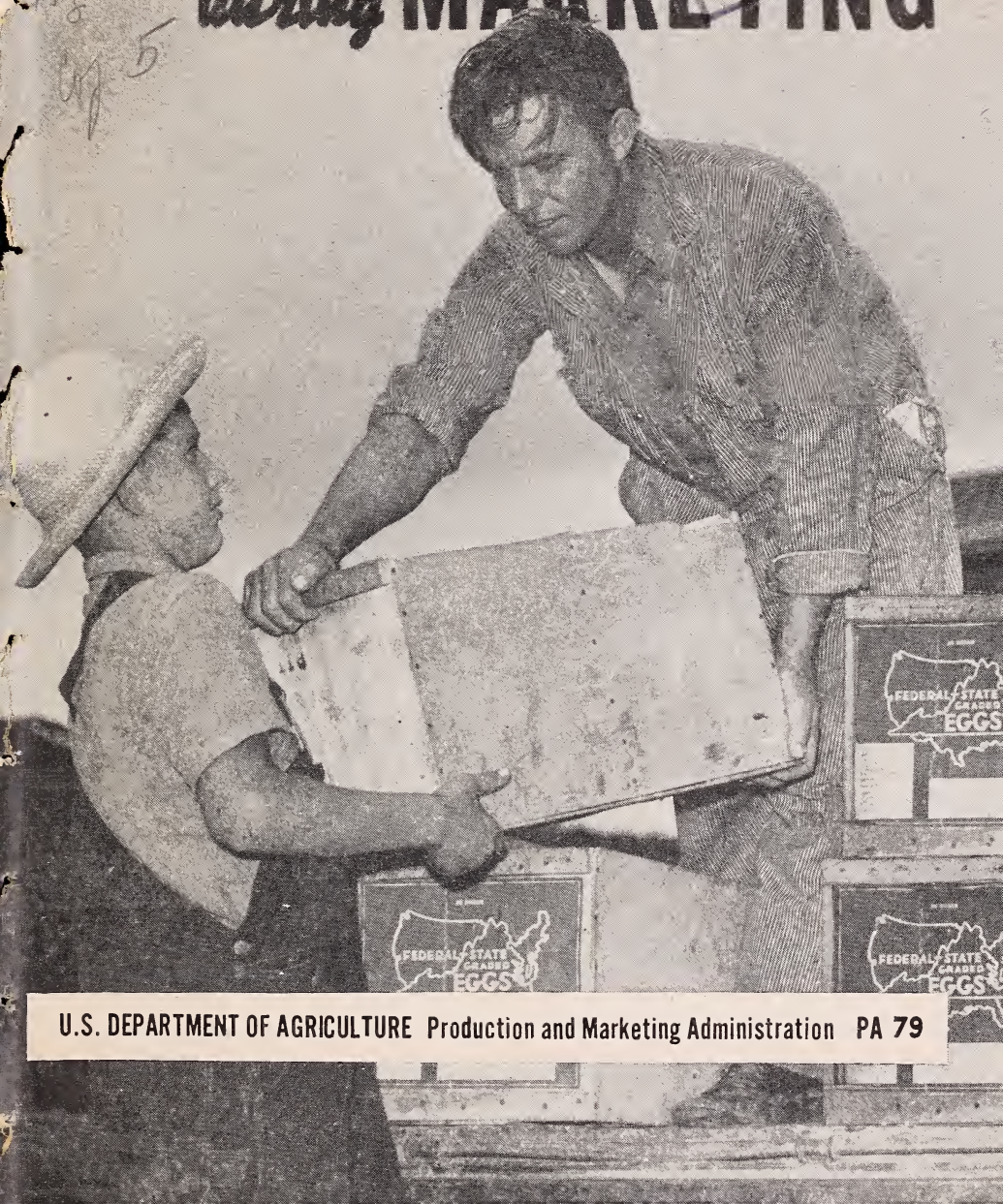
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Deterioration of EGG QUALITY *during* MARKETING

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This publication summarizes in popular form the results of a study of decline in the quality of eggs during two steps of the marketing process—from producer to country buyer to carlot assembler. The study was made by the agricultural experiment stations of 13 States and the United States Department of Agriculture under authority of the Research and Marketing Act of 1946. The findings are given in greater detail in Special Bulletin 361, entitled "Changes in Egg Quality During Marketing," published in August 1949 by the Agricultural Experiment Station of Michigan, in cooperation with the agricultural experiment stations of the other 12 States and the U. S. Department of Agriculture.

The other States participating in the study were: Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. The United States Department of Agriculture agencies that participated were the Poultry Branch of the Production and Marketing Administration, the Farm Credit Administration, and the Bureau of Agricultural Economics.

Washington, D. C.

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DETERIORATION OF EGG QUALITY DURING MARKETING

- Practically all eggs are high-quality table eggs when the hens lay them.
- But one out of every three eggs has dropped below Grade A in quality by the time farmers sell them to country stores and other first receivers.
- And more than two eggs out of five are below Grade A about 2 days later, when they reach the carlot assembler—only the second stop in a marketing journey that often lasts 2 or 3 weeks.
- Interior quality deteriorates least, on the journey between country buyer and carlot assembler, when egg quality is high at the time the journey begins, when the trip takes the shortest time, and when egg-case temperatures are kept down.

These statements are true for the 12 North Central States and Kentucky—States that usually produce about half the eggs of this country—according to a recent survey (see page 11). It's no news to producers and egg handlers that egg quality goes down while eggs move to market. Uncertainties about egg quality in marketing channels have been making trouble for a long time. Until now, though, no broad-scale field studies have been made to measure deterioration at any point along the line.

This survey was no attempt to pin down deterioration all along the line. The aim was to discover the quality of eggs as they reached the first receiver (the country buyer) and the second receiver (the carlot assembler), and to examine certain marketing factors that helped cause the decline during the trip as far as the second receiver. Other studies now under way will spotlight deterioration at other stations on the route from nest to frying pan.

QUALITY AT COUNTRY BUYING STATION

Eggs in 100-egg lots—enough to exemplify quality for the 13-State region—were graded on arrival at the country buying stations. One lot from each of 7,200 cases of eggs was graded, and the lots averaged 66.7 percent AA and A quality. The variation in this percentage for spring, summer, and fall—the three seasons studied—and the percentage of “stains” and “dirties” found, are shown in table 1.

Wide variations were shown in the quality that producers sold in the same area on the same day, and even to the same buyer. An extreme instance: Two 100-egg samples were graded at a country buying station on the same day. One sample had 90 percent of A's; the other, none.

Two out of every three eggs sold by producers, then, were of A quality (including both AA and A grades). It is generally admitted that nearly 100 percent of new-laid eggs are of A quality. But if we assume that practically all eggs are of top quality at the time they are laid, the average egg has lost a considerable part of its value by the time it is sold.

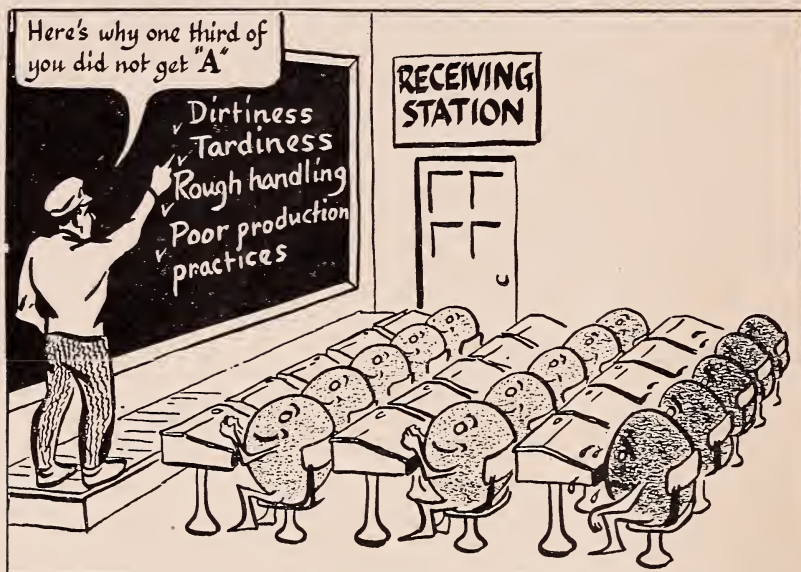


Figure 1.—Only two-thirds of the eggs that producers delivered to country buyers were A grade.

The price that buyers (except those who buy according to grade) pay to producers will vary with the average yield of top-quality eggs included in the purchases. If a buyer could expect three top-quality eggs from each three he buys, his buying price could be above what he can pay for lots in which only two out of three eggs are of top quality.

If the average price to producers is to be raised, the producer who markets low-quality eggs is the one who, in particular, must be encouraged to improve his practices. A producer who now sells no A-quality eggs can profitably increase his percentage of A's whereas the producer who is now selling 80 percent A's may find it unprofitable to do so.

TABLE 1.—*Percentages of A-quality eggs and of stains and dirties in eggs delivered by producers in the 12 North Central States and Kentucky, by seasons, 1948*

Season	Eggs of A quality ¹	Stains and dirties
	<i>Percent</i>	<i>Percent</i>
Spring.....	65. 4	10. 9
Summer.....	64. 2	11. 1
Fall.....	71. 6	10. 3
Average.....	66. 7	10. 8

¹ Eggs that graded either AA or A were called A-quality eggs.

Method of sale. Eggs sold according to the two methods of sale available to farmers—the graded basis and the ungraded basis—were compared in quality. Sales were classified as ungraded when practically all the eggs were paid for at the same price at any particular time; and as graded when paid for according to two or more grades. Of the samples examined, 55 percent were sold on a graded basis in the spring, 59 percent in the summer, and 73 percent in the fall.

In summer, eggs sold by producers on a graded basis had a considerably higher average percentage of A's than those sold ungraded. In spring and fall, the difference was relatively less. For all three seasons, the average of stained and dirty eggs in the ungraded lots was 17 percent; in graded lots, 7 percent.

Stained and dirty eggs when sold on a graded basis are usually paid for at the same price as C-quality or checked eggs, without regard to interior quality. So there is a financial incentive for producers to market clean eggs if they are selling on a graded basis.

The improved quality reflected by more A's (clean) and by fewer stained and dirty eggs at country buying stations where buying was by grade, indicated that producers who sell to such stations either take better care of their eggs or clean them before marketing. The figures also tended to show that the most significant result of better handling practices by producers and buyers is a higher percentage of clean eggs in marketing channels.

Three factors limit the benefits of selling according to grade. First, local stores sometimes buy ungraded eggs, but only from producers who offer consistently high-quality eggs. This practice has much the same effect as grading, which would be unnecessary if the eggs delivered were of consistently good quality. Presumably, the producer could demand a price commensurate with the quality of his product.

Second, grading is of little or no advantage to the producer if the price differential between high- and low-grade eggs is very narrow. The producer cannot afford, for example, to give his eggs better care or to deliver them twice a week, instead of once, if the additional return is too small to warrant this extra work that might mean better eggs.

Third, the survey figures show the quality benefits of a grade-buying program to be greatest in summer. As a result, many buyers abandon the program in spring. This practice may not be a good one, because a seasonal switching between graded and ungraded buying would disregard some long-run considerations that were not studied. For example, seasonal buying shifts probably would interfere with the loyalty of the buyer's customers, and counteract incentives that encourage producers to improve and maintain quality the year-round.

Size of shipment. The survey showed rather conclusively that the greater the number of eggs per delivery, the higher the percentage of A-quality eggs. Although no producer practices were examined in this survey, a likely explanation of this find-

ing is that large producers take better care of their eggs than do small producers.

In deliveries of less than one case to local buyers, 65.4 percent of the lots were of A quality. A's in deliveries of from one to two cases were 65.8 percent; two or three cases, 67.3 percent; over three cases, 72.7 percent.

Further analysis, by seasons, showed that the relation was less consistent in spring and summer than in fall. Moreover, a study of the relationship between size of operation and egg quality required consideration of other factors. For example: How big is the laying flock? How frequently are eggs sent to market? How many market outlets are used? These factors would affect the size of shipments, but they might not affect egg quality to the same extent.

Type of buyer. Buyers included in the survey were classified as country stores, local independent buying stations, buying branches of carlot assemblers' plants, the carlot assemblers' plants themselves, and combinations of these types. In each season, country stores received the highest percentage of A-quality eggs. Differences in average quality among the lots received by the other types of buyers were relatively small.

DECLINES IN QUALITY DURING MARKETING

Quality change was shown by the differences in the percentages of A's and of checks at the two grading points—the country buyer's station and the carlot assembler's plant. (See table 2.)

A second measure of quality change was used in the study. A point method was devised, to represent in a single figure the total quality change (both internal and shell) for a given lot of eggs. Each point represents a decline in quality of 1 egg by one grade in each 100 eggs tested. Thus, 12 points might represent a decline in 12 eggs of one grade each, or in 6 eggs of two grades each, and so on. Stained and dirty eggs were graded according to their interior quality.

This point method provides a single measure of the physical change in quality. A dealer can use his own price scales in applying economic valuation to the points. For example, he might observe that, on an average, quality declined 12 points per 100 eggs. He could interpret this as meaning that 1 dozen

eggs had declined one level (for example, from A quality to B quality).

If there is a differential of 6 cents per dozen for each grade decline, then a point decline of 12 (representing a decline of one grade in 1 dozen eggs) would amount to a loss of 6 cents in value per 100 eggs—about three-fourths of a cent per dozen. With this estimate of the part that quality decline plays in his total marketing costs, he is in much better position to decide what changes in marketing practices he should make.

TABLE 2.—*Change in number of A-quality eggs and checks between country buying station and carlot assembler's plant, by seasons, 1948*

Season	A-quality eggs at country buying station	A-quality eggs at carlot assembler's plant	Decrease in number of A- quality eggs
	<i>Percent</i>	<i>Percent</i>	<i>Number eggs per hundred</i>
Spring.....	72. 2	62. 3	9. 9
Summer.....	68. 7	58. 9	9. 8
Fall.....	80. 0	74. 8	5. 2

Season	Checks at country buying station	Checks at carlot assembler's plant	Increase in checks
	<i>Percent</i>	<i>Percent</i>	<i>Number eggs per hundred</i>
Spring.....	4. 3	5. 0	0. 7
Summer.....	4. 7	5. 7	1. 0
Fall.....	3. 6	4. 2	. 6

To link quality decline with its possible causes, an estimate was made of the amount of quality change as a result of breakage and shell damage (as against interior quality change). It was expected, for example, that temperature and length of storage were more likely to cause changes in interior quality; and that the condition of the container, for example, was more likely to affect the amount of shell damage.

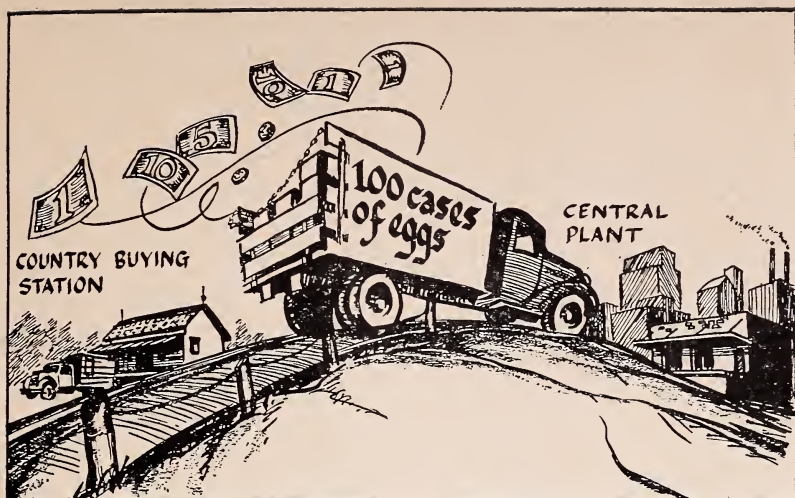


Figure 2.—Between the country buying station and the carlot assembler's plant, each 100 cases of eggs lost \$28.30 in value—shell damage accounting for \$6 and interior quality deterioration accounting for \$22.30.

In this survey, egg quality declined 13.1 points per 100 eggs, on an average, between the country buyer and the carlot assembler. This might mean a decline of 1.66 percent in value in 2 days' time. On the basis of prices that prevailed when eggs reached country buying stations in 1948, this would represent a loss of about \$28.30 for each 100 cases of eggs handled. The quality change and the decline in value of the eggs would be considerably greater in the entire time it takes to move eggs to the consumer. The 13.1 points included 10.2 points of decline in internal quality and 2.9 points of shell damage.

FACTORS CAUSING QUALITY DECLINE

Time between gradings. Egg lots were sorted according to the number of days between the grading at the country buying station and the grading at the carlot assembler's plant. This period ranged from less than 1 day to 8 days. In each of the three seasons, the total interior quality decline in point values increased as the number of days between gradings increased. (See table 3.) In addition, the seasonal differences in the rate

of decline seemed to be accentuated by the length of time between gradings. The time between gradings appeared to be the most important single factor analyzed.

TABLE 3.—*Effects of the holding time between gradings of eggs on the point values¹ of interior quality change, by seasons, 1948*

Season	Decline in quality during holding time of—		
	1 day or less	2 days	More than 2 days
	<i>Points</i>	<i>Points</i>	<i>Points</i>
Spring.....	7.5	10.4	13.6
Summer.....	7.8	13.0	17.6
Fall.....	4.0	6.8	9.8

¹ For definition of point values, see p. 5.

Case temperature. Thermometer readings were taken in the center of one side of the egg cases at the time of both the first and the second gradings. In general, the higher the temperature at the first grading, the greater was the rate of decline in

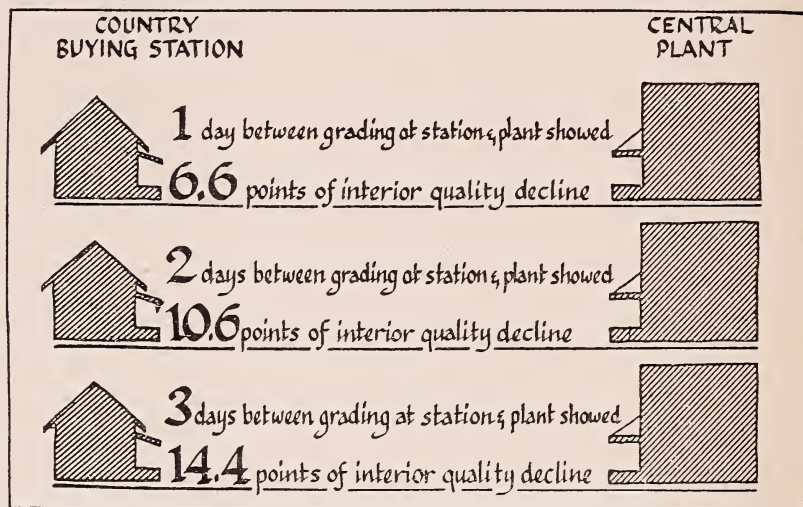


Figure 3.—Prompt shipment by the country buyer reduced the decline in interior quality.

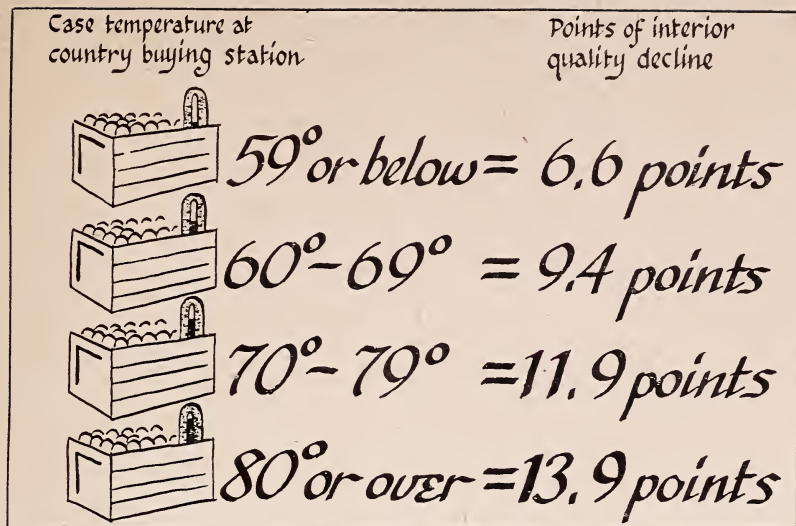


Figure 4.—Low case temperature at the country buying station meant less interior quality decline during marketing.

interior quality. There was a similar relationship between the case temperature at the second grading and the decline in interior quality, although it was less pronounced. The temperature changes that occurred between the two gradings showed no consistent effect on the rate of interior quality decline.

Other factors. The type of country buying station did not appear to have any relation to the rate of decline in quality between gradings.

The number of miles traveled between country buying station and carlot assembler's plant was associated with shell damage to only a slight extent.

SUMMARY

In brief, the 13-State study showed:

- One-third of the eggs that producers delivered to first receivers were below A quality. In these lots 11 percent of the eggs were stains and dirties.
- When the eggs reached the carlot assembler, about 2 days later, two-fifths were below A quality.

- Eggs that were sold on a graded basis averaged about 70 percent A's; those that were sold ungraded, about 60 percent. Graded eggs contained considerably less than half as many stains and dirties as did ungraded eggs.
- Between producer and carlot assembler, 13 eggs out of every 100 declined 1 grade under the point system.
- Best ways to reduce interior quality deterioration, as eggs move from country buyer to carlot assembler: Have quality high when the trip starts, make the trip quickly, and keep case temperatures down.